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Economic Intelligence Report

OSS: COORDINATING MECHANISM FOR POST AND TELECOMMUNICATIONS IN THE SINO-SOVIET BLOC

CIA/RR ER 62–15

May 1962

CENTRAL INTELLIGENCE AGENCY

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FOREWORD

This report was occasioned by a recent influx of high-validity material illustrating in detail many of the efforts now underway to achieve, under economic specialization, long-range, integrated development of the post and telecommunications sector of the Sino-Soviet Bloc. The report shows that these efforts are either controlled by or contingent on the decisions of the Organization for Cooperation Among Socialist Countries in the Fields of Post and Communications (OSS) in conjunction with responsible organizations in associated fields. The form and content of this report aim at a basic paper, against which future developments in Bloc-wide post and telecommunications can be evaluated. 50X1

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OSS: COORDINATING MECHANISM FOR POST AND TELECOMMUNICATIONS IN THE SINO-SOVIET BLOC*

Summary and Conclusions

The Organization for Cooperation Among Socialist Countries in the Fields of Post and Communications (OSS) operates under a general directive to coordinate long-term planning in its field. Under the directive, OSS assigns research and development projects to those countries, or groups of countries, possessing the best technical capability to carry them out successfully and promptly. Its chief concern has been to insure effective collaboration among scientific and engineering organs in the design and installation of a huge, new arterial network of telecommunications facilities that will more efficiently tie together Bloc activities over the long term. For this purpose, coaxial cable and microwave radio relay media have been chosen.

By the end of 1961, concrete progress had been made in this huge undertaking. Experimental transmissions have already commenced on the first sections of the international and intra-Bloc automatic telephone and telegraph service. Also, in conjunction with the International Radiobroadcasting and Television Organization (OIRT), a Sino-Soviet Bloc organ, the USSR and the European Satellites began the exchange of live television programs.

Although the responsibility for providing this huge network falls on civil ministries, military and other strategic requirements undoubtedly are taken into account. Military representatives participate in OSS meetings and probably press the military need. Also, the designed capacities of these new arterial media, far in excess of civil needs for some years to come, will provide facilities to satisfy other strategic needs.

Thus far, the achievements of OSS have not been startling. Much of its work has been of small scale and much of that in the embryonic stages. But its effectiveness is gaining momentum as it continues to produce more tangible results. The admittedly low level of technology in some Bloc countries has convinced the members of OSS that more advantages can be achieved in this field by working together.

* The estimates and conclusions in this report represent the best judgment of this Office as of 1 April 1962. For a glossary of technical terms, see Appendix A.

Under Soviet direction, OSS is likely to become an effective instrument to aid fulfillment of the Soviet Seven Year Plan (1959-65). Under the Plan the USSR has begun, for the first time, extensive exploitation of modern technology (automation, mechanization, and modernization) for the whole post and telecommunications sector of its economy. It probably will wish to exploit Bloc resources to achieve this end as well as to push this technological development forward into the other Bloc countries.

I. Organization of OSS

A. Purpose

OSS was established at a meeting held in Moscow in 1957 under the chairmanship of the Minister of Communications, USSR. The initiative for establishing OSS came from telecommunications authorities in the USSR who had long recognized that, in order to build a new, arterial network covering the Bloc, maximal use must be made of the manpower and technological resources of the national economies. They hoped to unify the efforts of, and to create greater interdependency among, departments of common interests in the ministries of post and telecommunications; to achieve compatibility of intra-Bloc facilities and services; and to lessen the drain on the Soviet economy.

The charter of the organization lists the following general tasks:

1. To develop and install more modern telegraph and telephone circuits between Bloc countries.

2. To advance the services of existing post and telecommunications networks between Bloc countries.

3. To consult on the problems, requirements, and specifications concerning designs and construction of microwave radio relay, cables, overhead wirelines, and communications equipment.

4. To study and adopt technical measures that will insure the mutual exchange of television and radiobroadcast programs.

5. To expand postal operations and to prepare and put into effect advanced methods for organizing and mechanizing postal work.

6. To consult on, and determine rates for, post and telecommunications services between one Bloc country and another.

7. To collaborate on scientific and technical research and development.

8. To coordinate the allocation and usage of radio frequencies.

9. To cooperate in studies and to exchange data on ionospheric radio wave propagation.

10. To render service for improving facilities when requested by members of OSS.

11. To coordinate the international activities of post and telecommunications organizations. 1/*

B. Member Countries

Membership in OSS includes the following Bloc countries: the USSR, Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Rumania, Communist China, Outer Mongolia, North Korea, and North Vietnam. Yugoslavia, at one time, was represented by observers but has not attended recent meetings.** The Minister of Post and Telecommunications in each country is its senior representative.

C. Ministerial Conferences

All resolutions or projects adopted under the aegis of OSS must be approved by a council of the ministers of post and telecommunications of all member countries. The minister has the responsibility for executing all adopted projects that are assigned to his country. He also has the responsibility for obtaining action from the outside agencies on projects that partially fall outside the province of his ministry.

Meetings of ministerial representatives were held in Moscow in 1957, in Prague in 1958, in East Berlin in 1959, and in Warsaw in 1961. Following the 1959 meeting, it was decided to hold meetings on the ministerial level only every 2 years unless special reasons dictate otherwise. The reasons for the 2-year spread are as follows:

1. Meetings of working groups have become increasingly frequent and more tightly coordinated, thereby lessening the watch-dog responsibilities of the ministers.

2. The interchange of OSS and CEMA*** activities has become so involved and the joint long-range plans so laboriously detailed that

* For serially numbered source references, see Appendix F.

** Post and telecommunications organizations that participate in OSS projects are listed in Appendix B. The status of Albania and Communist China as participants in future OSS projects is not known at the present time.

*** Council for Mutual Economic Assistance.

consultation, research, and decisions cannot be concluded adequately in a form for final approval by the ministers within a 12-month period. 2/

The next ministerial conference will be held in 1963, probably in Bucharest or Budapest.

D. Structure

Insofar as is known, OSS has no permanent chairman or secretariat. When ministerial conferences are not in session, the official activities of OSS, the preparatory work for ensuing conferences, and all correspondence are the responsibility of the national post and telecommunications ministry that is assigned to call the next scheduled ministerial conference. Official languages for oral interpretation are Chinese, German, Russian, and French. All official documents pertaining to conference activities are written in German and Russian. All final decisions of OSS are written in Chinese, German, and Russian. If there is any discrepancy in the language of a decision, the Russian version becomes authoritative. 3/

Administratively, OSS is broken down into at least six commissions, all of which are believed to be chaired permanently by a particular country*:

1. The First Commission for Telecommunications (Chairman: USSR) appears to be concerned with the development of wire, cable, and telephone equipment.

2. The Second Commission for Radio Communications (Chairman: USSR) handles the allocation of radio frequencies, the expansion of commercial radio facilities, and the technology involved in the exchange of television.

3. The Third Commission for Scientific and Technical Cooperation (Chairman: East Germany) is a coordinating group for the joint research and development problems of the First, Second, and Fourth Commissions.

4. The Fourth Commission for Postal Affairs (Chairman: Poland) is concerned with postal regulations, rates, and the development of equipment and methods for improving local and intra-Bloc service.

* Very little is known of their individual methods of operation, but details on their active projects are listed in numerical order in Appendixes C and D.

5. The Fifth Commission for Project Editing (Chairman: USSR) wields great power, inasmuch as it determines which projects of those proposed will be acceptable for final approval as a joint OSS effort.

6. The Sixth Commission for Long-Term Cooperation and Planning (Chairman: Poland), which was not created until 1959, compiles and controls statistical data supplied by member countries which measure their technological levels with those of the West.

Recently, two additional commissions may have been created, or possibly two new functions were incorporated into the Fifth and Sixth Commissions, respectively. One deals with the problems of press dissemination and the other with the economics of telecommunications. 4/

E. Operating Procedures

In its formative years, OSS was beset with the usual problems of a relatively new organization. By 1959, however, most of the difficulties had been resolved, primarily by increasing awareness on the part of the Satellite countries of the benefits to be accrued from a unified Bloc program in the complex field of technology. Seemingly, one of the most productive factors in the work of OSS is the relative freedom which research and development teams are allowed in carrying out their projects. Some control is evident -- and it probably is asserted by the USSR -- but it is neither cumbersome nor inhibiting.

Many initial concepts for projects undertaken by OSS originate outside the organization. Military representatives attend OSS meetings, and military requirements are bound to form fundamental considerations in the development of at least the major telecommunications projects. Some ideas on, and needs for, projects are known, however, to originate within Section Nine of CEMA,* with OIRT, and with OSS itself.

OSS has two methods for handling Bloc-wide projects. One is called the Independent Project, for which no country is designated as project coordinator. These projects appear to be concerned chiefly with local post and telecommunications problems, over which relatively little control is exercised by OSS. Each country participating in an independent project, however, forwards the results of its work to all other members** of OSS.

The second method is called the Coordinated Project.*** These are Bloc-wide in scope, they are controlled, and they proceed scrupulously

* Section Nine for Communications Technology, the Commission for Machine Building, CEMA, hereafter referred to as Section Nine.
** For a list of current OSS independent projects, see Appendix C.
*** For a list of current OSS coordinated projects, see Appendix D.

according to the original plans. Target dates, however, sometimes are deferred because equipment to be tested does not arrive on schedule. Once this type of project is proposed, it first must be approved by the Fifth Commission, which then forwards the approved project to the Central Scientific Research Institute for Communications (TsNIIS) at Moscow. Depending on the recommendations of member countries and on the peculiar domestic requirements and productive capacities of these countries, TsNIIS assigns the responsibilities of project coordinator and project participants to appropriate telecommunications institutes. Section Nine of CEMA apparently retains the privilege of approving or disapproving these assignments.

The Coordinating Institute for this type of project then allocates individual responsibilities and target dates for the research, construction, or testing phases of each project. This plan is followed by all participating institutes.

Once the appropriate OSS commissions have drawn up the technical requirements for an intra-Bloc project, these requirements are presented to Section Nine, which in turn carries out further collaboration with other CEMA commissions before the research project is given conclusive approval. These other commissions are those that would be involved in production of the various components for prototypes of telecommunications equipment or in providing mathematical machines and instruments for tests and measurements. After approving a completed project, OSS refers it to Section Nine. After Section Nine consults with other components of CEMA, the series production of equipment is allocated to the appropriate industries. 5/

The time that elapses between the initial presentation and final completion of an OSS project depends on its scope and priority. The development, for instance, of the intra-Bloc automatic telephone and telegraph system began in 1957, but it is not expected to be fully automated until 1980. Minor projects, such as determining the comparable advantages of using wooden or concrete telephone poles, often can be completed within a year.

II. Intra-Bloc Organizations Cooperating with OSS

Numerous intra-Bloc organizations cooperate in the work done by OSS working groups.* Three of the most important are described in the following subsections.

* For the participation of countries in Bloc-controlled telecommunications organizations, see the chart following p. 8.

A. Council for Mutual Economic Assistance (CEMA*)

CEMA was created in 1949 for the purpose of giving the USSR a key agency to coordinate the economic activities of the Soviet Bloc.** Within CEMA, Section Nine for Telecommunications Technology of the Commission for Machine Building conducts most of the coordinative effort with OSS. Hungary provides the permanent chairman. Membership in CEMA is composed of the USSR and the European Satellites. Communist China, North Korea, North Vietnam, and Outer Mongolia participate as observers only, as did Yugoslavia during 1956-57. 7/

Within the framework of a given project, Section Nine collectively assesses each country's natural resources, production capacity, traditions, and labor skills and analyzes their comparative costs and labor productivity. In conjunction with OSS, it assigns research and development tasks for designated equipment to specific Bloc countries. When the testing and experimental stages are completed, series production is allocated to those countries that are assumed to have adequate facilities to fill domestic and export requirements of the entire Bloc. Because of CEMA's involvement in coordinating so many aspects of the national economies, Section Nine may accept or reject plans that previously have been agreed on within OSS. 8/

B. International Radiobroadcasting and Television Organization (OIRT)

The original International Radiobroadcasting and Television Organization (OIR) was founded in Brussels in 1946. Initially its membership consisted of radiobroadcasting organizations of 28 European and Near Eastern countries. By 1950, however, in consequence of the persistently obstructive tactics of the countries of the Soviet Bloc, all members, except Finland and those of the Bloc, had withdrawn and formed the European Broadcasting Union (EBU).

The remaining countries reorganized into the International Radiobroadcasting and Television Organization (OIRT) to coordinate Bloc-wide broadcasting and television activities, with headquarters permanently set up in Prague. In 1952 the broadcasting organizations of Communist China and East Germany joined OIRT and, in subsequent years, Outer Mongolia, North Korea, North Vietnam, Egypt, and Iraq. Late in 1961, Cuba and Mali became members. Indonesia, Yugoslavia, and Morocco have attended as observers.

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* The German abbreviation is RGW (Rat fuer Gegenseitige Wirtschaftshilfe), and the Russian is SEV (Sovet Ekonomicheskoy Vzaimopomoshchi).
** For more detailed information on the organization and functions of CEMA, see source 6/.

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PARTICIPATION OF COUNTRIES IN BLOC-CONTROLLED POST AND TELECOMMUNICATIONS ORGANIZATIONS, 1961

EUROPEAN BLOC	OSS[1]	OIRT[2]	CEMA[3]	OSShD[4]
USSR	●	●	●	●
Albania	●	●	●	●
Bulgaria	●	●	●	●
Czechoslovakia	●	●	●	●
East Germany	●	●	●	●
Hungary	●	●	●	●
Poland	●	●	●	●
Rumania	●	●	●	●
ASIAN BLOC				
Communist China	●	●	●	●
Mongolia	●	●	●	●
North Korea	●	●	●	●
North Vietnam	●	●	●	●
OTHER				
Cuba		●		
Egypt		●		
Finland		●		
Indonesia		●		
Iraq		●		
Laos		●		
Mali		●		
Morocco		●		
Yugoslavia		●		

● *Member* ● *Observer*

[1] Organization for Cooperation Among Socialist Countries in the Field of Post and Communications
[2] International Radiobroadcasting and Television Organization
[3] Council for Mutual Economic Assistance
[4] Organization for Cooperation Among Socialist Railroads

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According to its charter, OIRT tries to establish good working relationships with other Bloc and non-Bloc organizations interested in radio and television broadcasting. It also is required to exchange technical information on problems of radio and television, on problems of transmission interference, and on the improvement of the technical quality of signals. Because television transmissions require broadband media, OIRT commissions work closely with OSS and Section Nine of CEMA in effectuating those that OSS was directed to develop.

Three main divisions carry out these important missions: the Technical Commission, the Program Commission, and the Television Commission. The latter arranges for the development and supervision of "Intervision," the intra-Bloc television network. 9/

C. Organization for Cooperation Among Socialist Railroads (OSShD)

The only other economic sector which has a coordinating organization comparable to OSS in structure and operation is the Organization for Cooperation Among Socialist Railroads (OSShD).* Like OSS, OSShD was formerly established in 1957 and includes as members all of the Sino-Soviet Bloc countries. Yugoslavia is neither a member nor an observer.

OSShD contains several committees that are given specific tasks to perform. Committee No. 7, which is permanently chaired by Poland, is concerned with signaling problems, automatic switching techniques, and the telephone and telegraph requirements of rail transport. The ultimate goal of Committee No. 7 is to standardize telecommunications equipments and practices so that faster, more reliable service on all state railroads in the countries of the Bloc in Europe and the Far East will be insured.

Some degree of consultation is assumed to take place between OSS and OSShD. Some member countries of OSShD recently set up special institutes to coordinate the long-range research deemed necessary to improve telecommunications and signaling. To achieve this coordination, it is likely that members of OSShD will employ facilities designed by OSS. 11/

III. Evaluation of the Accomplishments of OSS

The effectiveness of OSS as a coordinating organ has been clearly demonstrated by its concrete achievements. Statements made in the Bloc openly acknowledge that, without the existence of OSS, several major Bloc-wide projects could not have progressed as planned.

* For more detailed information on OSShD, see source 10/.

The most tangible measure of the effectiveness of OSS has been its largest and most challenging project. Since 1957 the organization has put its main efforts on the design and construction of a new Bloc-wide arterial telecommunications network. This huge project is complex in technology, extensive in geographical coverage, and massive in structural involvements. Nevertheless, some sections of this network of microwave radio relay and coaxial cable media, which employ the most modern technologies, are now going into service. In addition to new services (teledata, telecontrol, telemetering, telemechanics), these sections will yield a wide variety of conventional automatic telephone, telegraph, television, and radiobroadcasting services. Thus they will become the chief means of communication by which the Bloc will obtain tighter cohesion of its many activities.

IV. Future of OSS

It is expected that OSS will continue to be the top-level agency for bringing economic and technical talent together for the common solution to common problems in the post and telecommunications sectors of Bloc economies. Based on performance to the present, its future appears to be assured. If it has been competent enough to press successfully a project as massive as the new arterial network, it should be capable of pushing ahead with the long list of projects currently planned.* As it gains experience and prestige, OSS should be able to get things done better and faster.

* For a listing of all known OSS projects, see Appendixes C and D.

APPENDIX A

GLOSSARY OF TECHNICAL TERMS

Amplitude modulation (AM): The process by which a selected carrier frequency is varied in magnitude (amplitude) by other frequencies that contain the information to be transmitted in telecommunications. (See Frequency modulation.)

Apparatus: Instruments, machines, appliances, and other assemblies used in providing a telecommunications facility.

Automatic (as an adjective): Of or pertaining to any process involved in producing telecommunications service that does not require direct, immediate human assistance.

Band (of frequencies): The entire range of frequencies between two numerically specified frequency limits. The magnitude of this range is a limiting factor on the amount of information that can be transmitted in telecommunications. With respect to frequencies of the radio spectrum as a whole, the International Telecommunication Union has for convenience divided the whole radio spectrum into eight major bands, as follows:

Frequency Bands		
Range	Type	Corresponding Wave* Band
Up to 30 kc**	Very low frequencies (VLF)	Myriametric waves
30 to 300 kc	Low frequencies (LF)	Kilometric waves
300 to 3,000 kc	Medium frequencies (MF)	Hectometric waves
3,000 to 30,000 kc	High frequencies (HF)	Decametric waves
30,000 kc to 300 mc***	Very high frequencies (VHF)	Metric waves
300 to 3,000 mc	Ultra high frequencies (UHF)	Decimetric waves†
3,000 to 30,000 mc	Super high frequencies (SHF)	Centimetric waves†
30,000 to 300,000 mc	Extremely high frequencies (EHF)	Millimetric waves†

* Waves are undulating disturbances: a sound wave is a disturbance in the air, which is an elastic medium, and an electric wave is a disturbance in any medium whatever. The number of waves per second is the frequency of a given wave. Because the speed of wave propagation is considered to be constant, the length of a given wave is in inverse relation to its frequency: the longer the wave length, the lower the frequency; and the shorter the wave length, [footnote continued on p. 12]

Cable: A bundle of sheathed, insulated wires and/or coaxial tubes used as a telecommunications medium. It is sometimes referred to as "multiconductor cable."

Carrier (as an adjective): Of or pertaining to a technique for dividing a circuit, lane, supergroup, group, or channel into portions that can be used independently of and simultaneously with all other portions. Different frequencies or different pulses are selected for each portion to "carry" the information to be transmitted, after alteration by the information frequencies. The carrier itself need not be transmitted.

Channel: A portion, electrical or physical, of a telecommunications circuit, lane, supergroup, or group that can be used to transmit information independently of and simultaneously with all other portions. A channel may be used to provide two or more subchannels.

Circuit: A telecommunications connection between two or more distant points by a wire, cable, or radio medium facility used to carry information. The circuit is the fundamental telecommunications connection between distant points. By the application of appropriate techniques, a circuit may be arranged in many different combinations to meet the need for various kinds and quantities of telecommunications service. In its simplest form a circuit may carry only single telecommunications units in sequence. In its most complex form it may by apportionment carry simultaneously thousands of telephone channels and telegraph subchannels; a number of television programs; and other specialized kinds of service, such as high-fidelity broadcast programs, radar signals, and data-processing signals.

For the most complex application, a circuit is often arranged into lanes, each of which can carry, in one direction, 1 television program or up to 1,800 telephone channels. In turn, these 1,800 telephone channels are subdivided into 10 supergroups of 60 telephone channels each. Each supergroup is subdivided into 5 groups of 12 telephone channels each. One or more telephone channels may be further subdivided into 3 to 20 sixty-word-per minute teletype subchannels. Other specialized kinds of service may be accommodated by combining two or more telephone channels.

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the higher the frequency. Wave length usually is measured in linear units of the metric system.

** Kilocycles per second, or 1,000 cycles per second.

*** Megacycles per second, or 1 million cycles per second.

† It is becoming common usage to refer to waves (frequencies) in these three bands as "microwaves."

Coaxial (as an adjective): Of or pertaining to a modern telecommunications cable medium technique using one or more tubes (sometimes called "pipes"). Each metal tube surrounds a conducting wire supported concentrically by insulators. The space in the tube usually contains nitrogen gas under pressure. Generally, coaxial cable is used for the transmission of information in complex form, such as radar, computer data, or television signals, and/or for the transmission of telephone channels and telegraph subchannels. A single tube usually carries information in only one direction at a time. The capacity of a tube depends in part on the distance between repeater stations. In the standard facility, which may have from 2 to 8 tubes in the cable, a single tube carries a lane of up to 1,800 telephone channels or 1 television lane, for which the repeater station spacing is about 7 statute miles. In a new developmental coaxial cable facility, a single tube may carry 3 lanes of a total of 1,800 telephone channels or 3 television lanes, for which the repeater station spacing is expected to be about 3 statute miles.

Electronics: A general term used to identify that branch of electrical science and technology which treats of the behaviour of electrons in vacuums, gases, or solids. Today telecommunications makes extensive use of electronic technology.

Facility: An association of apparatus, material, and electrical energy required to furnish telecommunications service.

Facsimile (as an adjective): Of or pertaining to a telecommunications (telegraph) service in which photographs, drawings, handwriting, and printed matter are transmitted for graphically recorded reception. In one method (Type A), images are built up of lines or dots of constant intensity. In another method (Type B), images are built up of lines or dots of varying intensity, sometimes referred to as "telephoto" and "photoradio."

Feeder (as an adjective): Of or pertaining to telecommunications facilities of relatively low capacity that join facilities of relatively high capacity. (See Main.)

Frequency: The rate in cycles per second at which an electric current, voltage, wave, or field alternates in amplitude and/or direction. (See Band.)

Frequency modulation (FM): The process by which a selected carrier frequency is varied in frequency by other frequencies that contain the information to be transmitted in telecommunications. (See Amplitude modulation.)

Functional (as an adjective): Of, pertaining to, or connected with special, unique, or particular telecommunications facilities managed and operated by a single agency, organization, company, department, committee, ministry, or other entity, in contrast to the facilities of a basic system. (See Basic system.)

Group: A number of channels (usually 12) or subchannels combined (multiplexed) electrically in building up the total capacity of a telecommunications circuit, lane, or supergroup.

Ionosphere: Those layers of the earth's atmosphere occupying the space about 210 statute miles in thickness extending from about 30 statute miles above the earth's surface to the outer reaches (exosphere) of the atmosphere. Reflection from these layers makes possible long-distance transmission of radio signals. The layers, however, are responsible for fading of signals, skip distance, and differences between daytime and nighttime radio reception. The layers also are used as a scattering reflector for ionospheric scatter-transmission techniques to transmit to distances of about 1,000 to 1,500 statute miles.

Joint facility: A telecommunications facility owned, controlled, or operated by two or more agencies, organizations, companies, departments, committees, ministries, or other entities.

Lane: A one-way portion, electrical or physical, of a two-way telecommunications circuit that can be used independently of and simultaneously with all other portions. The largest lane today can handle 600 telephone channels or 1 television program. In some applications the direction of a lane may be reversed.

Leased (as an adjective): Of or pertaining to the direct operation by a user of a telecommunications facility owned by another agency.

Line: A general term used to delineate a telecommunications circuit facility (wire, cable, or radio).

Main (as an adjective): Of or pertaining to telecommunications facilities at and between principal cities and centers that have relatively high capacity compared with feeder facilities. (See Feeder.)

Medium: Any substance or space that can be used practically to transmit a form of electrical energy for the purpose of providing telecommunications service.

Microwave radio relay (as an adjective): Of or pertaining to a radio medium technique in modern telecommunications employing radio frequencies higher than 300 mc. These frequencies normally do not afford

practical direct transmission to great distances, principally because they do not bend well around the earth's surface and because they do not reflect well from the ionosphere. They are, however, capable of reliable transmission from horizon to horizon (line-of-sight) by the use of special antennas that concentrate the radio energy and give it desired direction. In consequence, great distances can be reached by this technique by the interposition of relay stations along the route of the line with a spacing interval of from 25 to 40 statute miles, depending on terrain conditions. This technique can be employed practically to carry from a small number of telephone channels and telegraph subchannels to thousands of such channels and subchannels through two or more lanes and to carry one of more television and other specialized lanes and channels. (See Band.)

Mobile (as an adjective): Of or pertaining to a telecommunications facility that is intended to be operational while in motion or during halts at unspecified points. (See Portable.)

Modulation: The process of altering a carrier frequency or carrier pulses by other frequencies or pulses representing the information being transmitted.

Multiplex (as an adjective): Of or pertaining to the combining of information signals, modulated or unmodulated, of two or more lanes, supergroups, groups, channels, or subchannels for transmission over the same circuit.

Network: An interconnection, electrical or physical, of two or more circuits or portions thereof for the purpose of facilitating telecommunications service.

Point-to-point (as an adjective): Of or pertaining to telecommunications service between fixed points, using the radio medium.

Portable (as an adjective): Of or pertaining to a telecommunications facility that can be readily moved from place to place but normally is not operational while in motion. (See Mobile.)

Private (as an adjective): Belonging to or concerning an individual person, organization, institution, or activity; not public or common.

Pulse: A spurt of electrical energy of extremely short duration (usually measured in millionths of a second) yet capable of being used in telecommunications to transmit information.

Quad: In a multiconductor telecommunications cable, the physical association of a group of four conductors in any one of various arrangements for the purpose of providing two-way multichannel operation.

Reception base: The aggregate telecommunications receiving facilities employed in providing a broadcast service.

Route: The geographical path followed by a wire, cable, or radio line.

Scatter (as an adjective): Of or pertaining to a radio medium technique in modern telecommunications by which energy in radio frequencies above 30 mc is deliberately scattered into one or the other of two reflecting portions of the atmosphere (troposphere and ionosphere) at such a predetermined angle that a usable portion of the energy arrives at the desired receiving location. This technique is especially applicable to regions in high latitudes (Arctic and Antarctic) where facilities of other media suffer from the rigors of weather and terrain and where the conventional long-distance radio media of the lower frequency bands (200 kc to 30 mc) are subject to serious disruptive propagational anomalies. (See Band.)

Subchannel: A portion, electrical or physical, of a telecommunications channel that can be used independently of and simultaneously with all other portions. An appreciable number of telephone channels usually can be subchanneled to carry from 3 to 20 sixty-word-per-minute teletype subchannels on each telephone channel so employed.

Subscriber: Any customer who directly operates telecommunications apparatus in obtaining telecommunications service.

Supergroup: A number of groups (often five) combined (multiplexed) electrically in building up the total capacity of a telecommunications circuit or lane.

System: All of the facilities and networks managed by a single agency, organization, company, department, committee, ministry, or other entity in rendering either functional or basic telecommunications service.

Telecommunications: Transmission, reception, or exchange of information between distant points by electrical energy over a wire, cable, or radio medium facility to produce telephone, telegraph, facsimile, broadcast (aural and visual), and other similar services.

Teletype (as an adjective): Of or pertaining to a technique for effecting telegraph service by the use of an apparatus similar to a typewriter in which information is transmitted by keyboard and received by type printer on a roll of paper or tape or by perforations on a roll of tape or both. The apparatus is sometimes called a "teleprinter" or a "teletypewriter."

Transmission base: The aggregate telecommunications transmitting facilities employed in providing broadcast service.

Transistor: A modern device that is capable of performing in a solid (germanium or silicon) many of the functions performed by the conventional electronic tube in a gas or vacuum.

Troposphere: The layer of the earth's atmosphere occupying the space from the earth's surface to a height of about 6 statute miles. This layer is used as a scattering reflector for tropospheric scatter-transmission techniques to distances of about 200 to 500 statute miles.

Wave guide (as an adjective): Of or pertaining to a telecommunications medium, now under development in several countries, that may be capable of transmitting extremely large amounts of conventional and complex information. It consists of a circular or rectangular hollow metallic tube in which electrical energy travels in the form of waves, much as do sound waves in a speaking tube.

Wire diffusion: Distribution of broadcast programs by a wire or cable medium to wired loudspeakers.

Wired loudspeaker: A telecommunications loudspeaker that receives from a distribution point one or more broadcast programs by a wire or cable medium.

Wireline: A general term used to identify a line consisting of either an aerial cable (and/or separate wires) or an underground cable used as a telecommunications medium.

APPENDIX B

ORGANIZATIONS MENTIONED IN THIS REPORT

Abbreviation	Full Name	Translation	Headquarters
International			
EBU	European Broadcasting Union		Brussels
ITU	International Telecommunication Union		Geneva
OIRT	International Radiobroadcasting and Television Organization		Prague
Intra-Bloc			
CEMA	Council for Mutual Economic Assistance		Moscow
OSS	Organizatsiya Sotrudnichestva Svyazi*	Organization for Cooperation Among Socialist Countries in the Fields of Post and Communications	Moscow
OSShD	German transliteration of Russian OSZhD -- Organizatsiya Sotrudnichestva Zheleznykh Dorog	Organization for Cooperation Among Socialist Railroads	Warsaw
Internal			
USSR			
IZMIRAN	Institut Zemnogo Magnetizma Ionosfery i Reprostraneniya Radiovoln, Akademiya Nauk	Institute for Terrestrial Magnetism, Ionosphere and Radio-Wave Propagation, Academy of Sciences	Krasnaya Pakhra, Moscow Oblast

* The exact designation of OSS is unknown.

Abbreviation	Full Name	Translation	Headquarters
Internal			
USSR (Continued)			
NIITs	Nauchno-Issledovatel'skiy Institut Gorodskoy i Sel'skoy Telefonnoy Svyazi	Scientific Research Institute of Urban and Rural Telephone Communications	Leningrad
TsKB	Tsentral'noye Konstruktskoye Byuro	Central Design Bureau	Moscow
TsNIIR	Tsentral'nyy Nauchno-Issledovatel'skiy Institut Radioizmereniy	Central Scientific Research Institute of Radiomeasurements	Moscow
TsNIIS	Tsentral'nyy Nauchno-Issledovatel'skiy Institut Svyazi	Central Scientific Research Institute of Communications	Moscow
Bulgaria			
NIIS	Nauchno-Issledovatelski Institut Suobshteniyata	Scientific Research Institute for Communications	Sofia
Czechoslovakia			
VURT	Vyzkumny Ustav Rozhlasu a Televize	Research Institute for Broadcasting and Television	Prague
VUS	Vyzkumny Ustar Spoju	Research Institute for Communications	Prague
East Germany			
BRF	Betriebslaboratorium fuer Rundfunk und Fernsehen	Laboratory for Radio and Television	East Berlin
IPF	Institut fuer Post- und Fernmeldewesen	Institute for Postal Affairs and Communications	East Berlin
Hungary			
PKI	Posta Kiserleti Intezet	Postal Service Experimental Institute	Budapest
Poland			
IL	Instytut Lacznosci	Institute for Communications	Warsaw

APPENDIX C

LIST OF INDEPENDENT OSS PROJECTS a/

Project Number	Subject	Participating Country	Participating Institute
1/59	Studies on the frequency compression of television signals	USSR East Germany	TsNIIR BRF
5/59	Studies of ionospheric and tropospheric scatter	USSR Bulgaria	TsNIIR NIIS VUS
13/59	Development of measures to counteract the rotting of wooden masts	USSR Bulgaria Czechoslovakia East Germany Hungary Poland Rumania	TsNIIS NIIS VUS IPF PKI IL N.A.
14/59	Development of nonwood masts	USSR Bulgaria Czechoslovakia Poland	TsNIIS NIIS VUS IL

a. All data are from source 12/. Consecutive numbers appear to be assigned indiscriminately to either independent projects or coordinated projects (which are listed in Appendix D). Some numbered projects are not mentioned in this report, because information is not available.

Project Number	Subject	Participating Country	Participating Institute
15/59	Studies in the field of telephone acoustics	USSR	TsNIIS
		Bulgaria	NIIS
		Czechoslovakia	VUS
		East Germany	IPF
		Hungary	PKI
		Poland	IL
		Rumania	N.A.
18.01/59	Development of railroad mail cars	Czechoslovakia	N.A.
		East Germany	N.A.
		Hungary	PKI
18.02/59	Development of containers for bag and package delivery	Czechoslovakia	N.A.
		East Germany	N.A.
18.03/59	Development of machinery for posting and stamping letters	USSR	TsNIIS
			TsKB
		Rumania	N.A.
18.04/59	Development of a semiautomatic machine for sorting letters in 70 to 140 directions	USSR	TsNIIS
			TsKB
		Bulgaria	NIIS
		East Germany	IPF
		Rumania	N.A.

Project Number	Subject	Participating	
		Country	Institute
18.05/59	Development of an automatic machine for sorting letters in 200 or more directions	USSR	TsNIIS TsKB
		Bulgaria	NIIS
		East Germany	IPF
18.06/59	Development of a semiautomatic machine for sorting packages weighing 3 to 5 kilograms	Czechoslovakia	VUS
		East Germany	N.A.
18.07/59	Development of semiautomatic machines for sorting packages in 20 or more directions	USSR	TsNIIS TsKB
		East Germany	IPF
18.08/59	Development of equipment for dispatching and signaling services in large post offices	USSR	TsNIIS
		East Germany	IPF
18.09/59	Development of a transfer-acceptance machine	Czechoslovakia	VUS
18.10/59	Development of an automatic scale for weighing letters up to 2 kilograms	Czechoslovakia	VUS
		Hungary	PKI
		Poland	IL
18.11/59	Development of an automatic scale for weighing packages up to 25 kilograms	Czechoslovakia	VUS
		Hungary	PKI
		Poland	IL

Project Number	Subject	Participating Country	Participating Institute
18.12/59	Development of an automatic scale for counting and stamping packages	Czechoslovakia Hungary Poland	VUS PKI IL
18.13/59	Coin automats for the sale of stamps, postcards, and newspapers	USSR East Germany Hungary Rumania	TsNIIS IPF PKI N.A.
18.14/59	Counter automats for the sale of stamps	East Germany Poland	IPF IL
18.15/59	Development of category-sorting of letters	USSR East Germany Poland	N.A. IPF IL
18.16/59	Study and evaluation of the economic advantages of mechanization in postal operations	USSR Czechoslovakia East Germany	TsNIIS VUS IPF
19.04/59	Development of semiautomatic machines for sorting letters in 70 to 140 directions	USSR Bulgaria East Germany Rumania	TsNIIS TsKB NIIS IPF N.A.

APPENDIX D

LIST OF COORDINATED OSS PROJECTS a/

Project Number	Subject	Directing		Participating	
		Country	Institute	Country	Institute
2/59	Studies in the field of telephone traffic theory	East Germany	IPF	USSR Czechoslovakia Poland	VUS NIITs IL
3/59	Studies in the field of radio interference	East Germany	BRF	USSR Bulgaria Czechoslovakia Hungary Poland	TsNIIR NIIS VUS PKI IL
4/59	Studies for perfecting black and white television	USSR	TsNIIR	Bulgaria Czechoslovakia East Germany Poland	NIIS VURT BRF IL
6/59	Studies on the extension of medium and long waves over long distances	East Germany	BRF	USSR Bulgaria Poland	IZMIRAN NIIS IL

a. All data are from source 13/. Consecutive numbers appear to be assigned indiscriminately to either coordinated projects or independent projects (which are listed in Appendix C). Some numbered projects are not mentioned in this report, because information is not available.

Project Number	Subject	Directing		Participating	
		Country	Institute	Country	Institute
8/59	Studies for measuring the level of atmospheric interference	USSR	IZMIRAN	Bulgaria	NIIS
				Communist China	N.A.
				Czechoslovakia	VURT
					VUS
				Rumania	N.A.
10/59	Studies concerning technical requirements for intra-Bloc and international telegraph service	East Germany	IPF	USSR	TsNIIS
				Bulgaria	NIIS
				Poland	IL
11/59	Developments of procedures and instruments for keeping cable under pressure and locating malfunctions	Poland	IL	USSR	TsNIIS
				East Germany	IPF
12/59	Studies for protecting telecommunications facilities against interference by high-tension power lines, electric railroads, and the like	Hungary		USSR	TsNIIS
				Communist China	N.A.
				Czechoslovakia	VUS
				East Germany	IPF
				Poland	IL
16/59	Development of new testing procedures and instruments for long-distance traffic on cable and radio relay lines	USSR	TsNIIR	USSR	TsNIIS
				Bulgaria	NIIS
				Communist China	NIIS
				Czechoslovakia	VUS
				East Germany	IPF
				Hungary	PKI
				Poland	IL
				Rumania	N.A.

Project Number	Subject	Directing		Participating	
		Country	Institute	Country	Institute
17/59	Development of power installations for emergency switching	East Germany	IPF	Czechoslovakia Bulgaria	VUS NIIS
1/60	Studies on the construction and maintenance of wireline and cable	USSR	TsNIIS	East Germany Poland	IPF IL
1/61	Development of radio interference measuring technology for a range of 300 to 1,000 megacycles	East Germany	BRF	USSR Czechoslovakia	TsNIIR VUS
2/61	Economic studies for determining limits of research and radio interference	Czechoslovakia	VUS	USSR Poland	TsNIIR IL
3/61	Equipment specifications for audio-frequency telegraph installations	USSR	TsNIIS	Czechoslovakia Communist China East Germany Poland	VUS NIIS IPF IL
4/61	Equipment specifications for transmission channels for data transmission	USSR	TsNIIS	Czechoslovakia East Germany Poland Communist China	VUS IPF IL N.A.
5/61	Development of electronic automatic telephone exchange and related sets	East Germany	IPF	USSR Czechoslovakia	NIITs VUS VURT
6/61	Development of a system for stereophonic radiobroadcasting	East Germany	BRF	USSR Czechoslovakia Poland	TsNIIR VURT IL

Project Number	Subject	Directing		Participating	
		Country	Institute	Country	Institute
7/61	Development of a color television system	USSR	TsNIIR	Czechoslovakia East Germany Poland	VURT BRF IL
8/61	Development of technology for use of bands IV and V in television	USSR	TsNIIR	Czechoslovakia East Germany Poland	VUS BRF IL
9/61	Development of technology for using coaxial cables on local television feeder installations	USSR	TsNIIS	Czechoslovakia East Germany Poland	VUS IPF IL
10/61	Development of radio interference measuring devices for a range of 300 to 1,000 megacycles	East Germany	BRF	USSR Czechoslovakia Poland	TsNIIR VUS IL
11/61	Development of system and specifications for the transport of foreign mail	East Germany	IPF	Communist China Czechoslovakia East Germany Poland	N.A. VUS IPF IL
1/62	Investigation of the costs and reliability of plastic cables	N.A.	N.A.		
2/62	Research on wave propagation in bands IV and V	East Germany	BRF	Czechoslovakia Poland Rumania	VUS IL N.A.
3/62	Economic studies for mail processing procedures	Poland	IL	Czechoslovakia East Germany Hungary Poland	VUS IPF PKI IL

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